



The largest blindsnake in Mesoamerica: a new species of *Typhlops* (Squamata: Typhlopidae) from an isolated karstic mountain in Honduras

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Abstract

A distinctive new species of *Typhlops* is described from Parque Nacional Montaña de Santa Bárbara, 1550 m elevation, Departamento de Santa Bárbara, Honduras. The holotype and only known specimen of this new taxon is the largest specimen of the genus thus far reported from Mexico and Central America, and is further differentiated from all other Mesoamerican *Typhlops* by having 22–22–22 scales around the body and by having a dark brownish gray dorsum with a well-defined pale yellowish gray to immaculate white ventral coloration. This species is a member of the Caribbean Arc Group of *Typhlops*. An updated key to the Typhlopidae of Mesoamerica is provided.

Key words: Cloud forest, Karst, Nuclear Central America, Parque Nacional Montaña de Santa Bárbara, Reptilia, Scolecophidia, Serpentes

Resumen

Se describe una nueva distintiva especie de *Typhlops* procedente del Parque Nacional Montaña de Santa Bárbara a 1550 m de elevación en el Departamento de Santa Bárbara, Honduras. El holotipo y único espécimen conocido de este nuevo taxón es el espécimen más grande del género reportado hasta ahora para México y Centro América. Adicionalmente, se diferencia de las demás *Typhlops* de Mesoamérica por tener 22–22–22 escamas alrededor del cuerpo y por tener el dorso de color gris pardusco con un patrón ventral bien definido de color gris amarillento pálido a blanco immaculado. Esta especie es un miembro del grupo de *Typhlops* del Arco Caribeño. Se proporciona una clave nueva para las serpientes Typhlopidae de Mesoamerica.

Introduction

Blindsnakes of the genus *Typhlops* (Squamata: Typhlopidae) have a cosmopolitan and primarily tropical distribution (McDiarmid et al., 1999), with the majority of diversity in the Western Hemisphere confined to the islands of the West Indies (Dixon & Hendricks, 1979; Thomas & Hedges, 2007). Currently, there are only four species of *Typhlops* known to occur from Mexico to Costa Rica (Dixon & Hendricks, 1979; Köhler, 2003): *T. costaricensis* Jimenez & Savage, 1962 (Honduras to Costa Rica), *T. microstomus* Cope, 1866 (Yucatan Penin-

sula), *T. stadelmani* Schmidt, 1936 (western and northern Honduras), and *T. tenuis* Salvin, 1860 (Veracruz, Mexico, to Guatemala). A fifth typhlopoid, the parthenogenetic *Ramphotyphlops braminus* Daubin, 1803, has been introduced to scattered localities throughout Mesoamerica, primarily around urban areas (Köhler, 2003).

Two species of blindsnakes (*T. costaricensis* and *T. stadelmani*) are known to occur in eastern Nuclear Central America (Fig. 1), which we consider to be the highlands south of the lower Río Motagua and east of a line in Guatemala connecting Zacapa, Chiquimula, Concepción Las Minas, and the Guatemalan-El Salvador border at the Pacific Coast, all of the Honduran and El Salvadoran highlands, and the highlands of Nicaragua north of Lago de Cocibolca (Campbell, 1999). Both of these species occur in Honduras; *Typhlops costaricensis* is known from localities in the mesic lowlands of Departamento de Gracias a Dios and from mid-elevation pine-oak forest localities between Tegucigalpa and Parque Nacional La Tigra in Depto. Francisco Morazán (Fig. 1; McCranie et al., 2005; Wilson et al., 1988), and *T. stadelmani*, which is reported from mid-elevation localities in the departments of Atlántida, Copán, and Yoro (Fig. 1; McCranie & Castañeda, 2005; McCranie & Wilson, 2001). *Typhlops stadelmani* was, until recently, considered a junior synonym of *T. tenuis* (Dixon & Hendricks, 1979), but was resurrected by McCranie & Wilson (2001) after collection of a large series that verified its distinctiveness, based primarily on differences in the number of scales between rostral and tail tip and in color.

Recent fieldwork in Honduras by the authors included collection of a single specimen of a large, distinctive, and hitherto unknown species of *Typhlops* from Parque Nacional Montaña de Santa Bárbara, an isolated karstic mountain that is the second highest peak (2744 m) in Honduras. The specimen was found freshly killed on an unpaved road between two small communities near the lower edge of intact cloud forest. Attempts at acquiring additional material of this snake have thus far been unsuccessful. Given the remarkable morphological distinctiveness of the specimen contrasted with the relatively conserved morphology typical of Mesoamerican *Typhlops*, as well as the potential conservation implications of its discovery, we provide the following description of the new species of *Typhlops*.

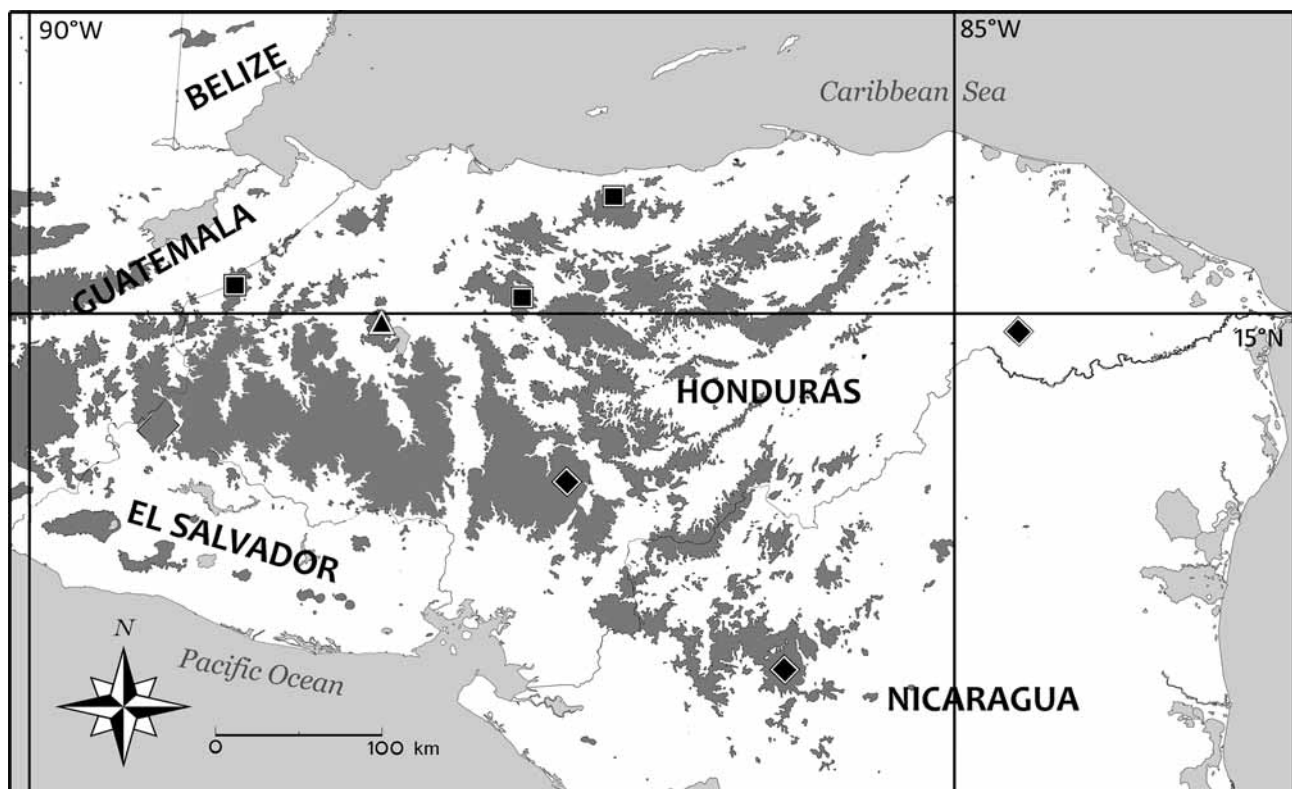


FIGURE 1. Distribution of *Typhlops* in eastern Nuclear Central America, shaded areas indicate >1000 m elevation. Triangle = *T. tycherus* n. sp., diamonds = *T. costaricensis*, squares = *T. stadelmani*.

Material and methods

Terminology, measurements, and methods follow those of Dixon & Hendricks (1979). All measurements were taken to the nearest 0.1 mm with either digital calipers or a stereomicroscope with an optical micrometer. Measurements taken are as follows, with abbreviations used in Table 1 given parenthetically: scale rows around body (SAB) measured 20 dorsal scales posterior to rostral scale, at midbody, and 20 dorsal scales anterior to vent (Dorsals); dorsal scales counted along dorsal midline between rostral and terminal tail scale; total length (TTL) from tip of snout to tip of tail; tail length (TL) from posterior border of vent to tail tip; head width (HW) at level of eyes; anterior body width (ABW) at one head length posterior to head; midbody width (MBW); posterior body width (PBW) at one head length anterior to cloaca; width at middle of tail (MTW); maximum rostral length (RL) as seen from above from anterior edge of snout to posterior edge of rostral, taken parallel to midline of body; rostral width (RW), taken at maximum width of rostral; width of visible eye spot (ED); distance between eyespot and posterior edge of nostril (EN); distance between interior edges of eyespots (IRORB). Comparative data were taken from specimens examined (Appendix), and from Dixon & Hendricks (1979), Rodrigues (1991), Schwartz & Henderson (1991), McCranie & Wilson (2002), Rodrigues & Juncá (2002), and Thomas & Hedges (2007). The following museum and university abbreviations are used: Florida Museum of Natural History, University of Florida, Gainesville (UF); National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); Universidad Nacional Autónoma de Honduras, Tegucigalpa (UNAH).

Typhlops tycherus new species

(Figs. 2, 3)

Holotype. Adult female (UF 151797), on road between San José de Los Andes and El Cedral (14°54.241'N, 88°05.489'W), 1550 m elevation, western slope of Montaña de Santa Bárbara (Fig. 4), Parque Nacional Montaña de Santa Bárbara, Depto. Santa Bárbara, Honduras, collected 3 February 2008 by Laura E. Chakerian and Lorraine P. Ketzler, original field number JHT 2376.

Diagnosis. *Typhlops tycherus* can be most readily distinguished from all other snakes in the mainland of the Western Hemisphere based on the number of scale rows around the body (22); all other *Typhlops* found in the mainland of the Western Hemisphere have 18–18–18 (*T. amoipira*, *T. microstomus*, *T. paucisquamis*, *T. stadelmani*, *T. tenuis* and *T. yonenagae*), 20–20–20 (*T. brongersmianus*, *T. costaricensis*, *T. lehneri*, *T. reticulatus*, and *T. trinitatus*), or 20–18–16 or 18–16–14 (*T. minuisquamis*). Of the Mesoamerican *Typhlops*, *T. tycherus* is further differentiated as follows: from *T. costaricensis* by having a well-defined pale yellowish gray to immaculate white venter (venter somewhat lighter but grading into dorsal coloration throughout most of the body with yellowish gray or unpigmented scales restricted to chin and throat and posterior portion of body, with scattered pale spots along the midventral line in *T. costaricensis*); from *T. microstomus* by having fewer dorsal scales between the rostral and tail tip (395, versus 487–566 in *T. microstomus*), a relatively longer tail (TL/TTL = 1.51, versus 0.37–1.36 in *T. microstomus*) and by lacking a subocular; from *T. stadelmani* in having more dorsal scales between the rostral and tail tip (395, versus 341–369 in *T. stadelmani*) and larger maximum total length (371 mm, versus 310 mm in *T. stadelmani*); and from *T. tenuis* in lacking spots on median dorsal scale rows (dorsal spots present on at least median scale rows in *T. tenuis*) and having larger maximum total length (371 mm, versus 326 mm in *T. tenuis*). Additional comparative data, measurements, and ratios for the Mesoamerican *Typhlops* are given in Table 1. From the South American species (other than *T. lehneri*, which has 18–18–18 scales around the body), *T. tycherus* is further distinguished by having a completely divided nasal with the suture contacting the rostral (nasal not completely divided in *T. amoipira*, *T. brongersmianus*, *T. reticulatus*, *T. trinitatus*, *T. paucisquamis*, and *T. yonenagae*). In the Western Hemisphere

outside of Mesoamerica and South America, *T. tycherus* most closely resembles the 11 members of the *T. biminiensis* species group from the Bahamas, the Cayman Islands, and Cuba, from which it may be distinguished as follows: having 22–22–22 scales around the body (26–24–24 in *T. arator* and 20–20–20 in *T. caymanensis*) and 395 scales between rostral and tail tip (453–579 in *T. anchaurus*, *T. anousius*, *T. biminiensis*, *T. contorhinus*, *T. epactius*, *T. notorachius*, *T. paradoxus*, *T. perimychus*, and *T. satelles*).

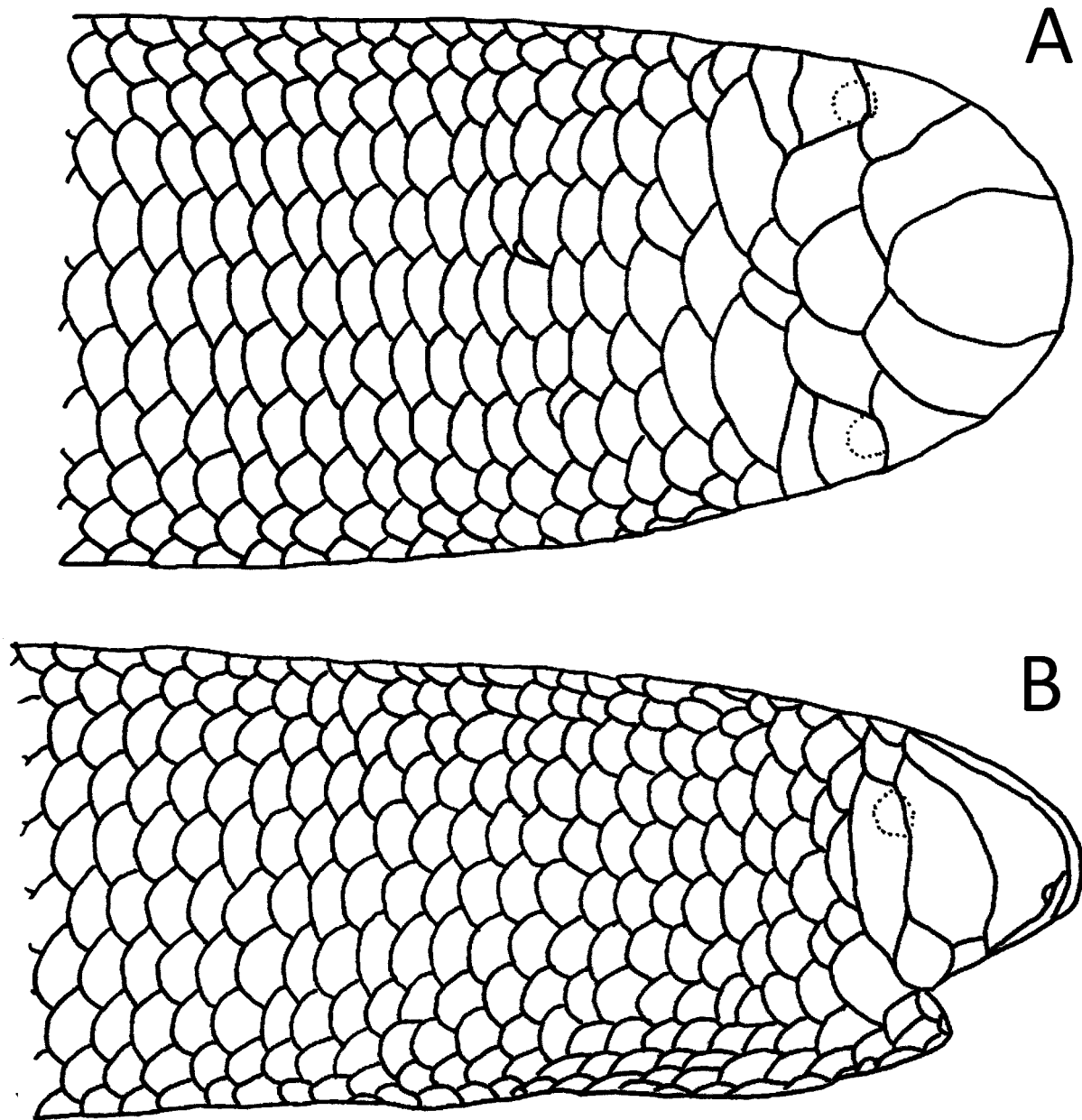


FIGURE 2. Scalation of the head of the holotype of *Typhlops tycherus*. A = dorsal view, B = lateral view.

Description. A large *Typhlops*, total length 371 mm, tail length 5.6 mm; 22–22–22 scales around body; 395 dorsal scales between rostral and tail tip; subcaudals 8; head width at level of eye 6.3 mm; anterior body width 7.6, midbody width 9.1, posterior body width 8.7 mm; tail length 1.51% of total length; mid-tail width 5.6 mm; rostral length 2.9 mm, width 2.1 mm, reaching posteriorly to level of anterior edge of eyespots, widest point about halfway between tip of snout and posterior tip of rostral; rostral bordered by two prefrontals that extend posteriorly beyond tip of rostral; nasal suture complete, dividing anterior and posterior nasals; inferior nasal suture contacts second supralabial; eye diameter 0.4 mm; eye-nostril distance 2.3 mm; interor-

bital distance 4.2 mm, 66.7% of head width; parietals 2/2, anterior parietals cycloid, bordered posteriorly by second pair of wide, narrow occipitals; occipitals spanning about two dorsal scales; frontal contacted at posterior apex by two small scales that interrupt contact between occipitals; 4/4 supralabials, becoming large posteriorly; second and third supralabials contacting preocular; supralabial imbrication pattern T-III; preoculars about twice as high as wide, contacting anterior edge of eye spot; ocular about twice as high as wide at maximum; mental small, roughly equal in size to adjacent infralabials and chin scales; infralabials 4/4, roughly equivalent in size to each other and adjacent scales.



FIGURE 3. Dorsal and ventral aspects of the preserved holotype of *Typhlops tycherus*.

TABLE 1. Comparison of morphological characteristics and ratios for the *Typhlops* of Mesoamerica; abbreviations are summarized in the Materials and Methods section; ranges of measurements, counts, and ratios are followed by the mean (and standard deviation, for dorsals) in parentheses; data were taken from specimens examined (Appendix), and from Dixon & Hendricks (1979) and McCranie & Wilson (2001).

	<i>T. tycherus</i>	<i>T. costaricensis</i>	<i>T. microstomus</i>	<i>T. stadelmani</i>	<i>T. tenuis</i>
SAB	22-22-22	20-20-20	18-18-18	18-18-18	18-18-18
Dorsals	395	390-413 (397.7 ± 7.9)	487-566 (530.7 ± 21.0)	341-369 (357.0 ± 8.1)	361-441 (399.9 ± 18.8)
TTL	371	262-360 (301.3)	146-366 (277.7)	112-310 (203.4)	112-326 (243.6)
TL/TTL	1.51	1.28-1.73 (1.45)	0.37-1.36 (0.95)	1.00-2.28 (1.67)	1.09-2.37 (1.54)
HW/TTL	1.7	1.5-1.93 (1.78)	0.95-1.61 (1.22)	1.13-1.96 (1.49)	1.23-2.41 (1.58)
ABW/TTL	2.05	1.75-2.19 (2.02)	1.13-1.86 (1.38)	1.19-2.04 (1.57)	1.16-2.5 (1.72)
MBW/TTL	2.45	2.25-2.72 (2.55)	1.29-2.0 (1.58)	1.42-2.41 (1.77)	1.35-2.94 (1.95)
PBW/TTL	2.35	2.13-2.87 (2.52)	1.13-2.2 (1.48)	1.26-2.23 (1.69)	1.33-2.86 (1.84)
MTW/TTL	1.51	1.27-1.77 (1.54)	0.71-1.53 (0.98)	0.90-1.47 (1.18)	1.06-1.87 (1.33)
RL/RW	133.8	133.3-152.4 (144.1)	142.8-209.1 (168.1)	121.4-200.0 (153.0)	116.7-176.9 (146.5)
RL/HW	46.0	47.1-56.4 (52.9)	48.1-74.2 (57.7)	47.1-56.3 (53.1)	44.4-64.3 (53.4)
RW/HW	33.3	34.8-38.9 (36.7)	29.3-40.0 (34.4)	27.3-45.2 (35.1)	29.6-41.5 (36.6)
ED/HW	6.35	3.8-8.7 (6.2)	2.56-8.68 (5.27)	2.94-7.41 (5.09)	2.38-8.0 (4.97)
EN/HW	36.51	39.6-51.8 (47.4)	39.0-55.6 (45.9)	42.3-56.3 (48.2)	35.4-55.3 (48.76)
INORB/HW	66.7	72.5-76.4 (74.1)	54.0-71.8 (63.2)	56.0-75.0 (67.8)	59.5-80.9 (68.55)

Dorsal color in preservative uniform dark brownish-gray, pigmented dorsal scale rows number from 13 to 19; some pale yellowish gray coloration around nostrils and on anteriormost portions of the head, ventral surface pale yellowish gray anteriorly, becoming immaculate white on posterior half of body; ventral coloration abruptly differentiated from dorsal coloration, extending unbroken for full length of body; unpigmented ventral region ranges from three to nine scales in width, uninterrupted throughout length of body, becoming broadest towards posterior end of body.

Distribution. The single known specimen of *Typhlops tycherus* (Fig. 3) was found dead on the road at 1550 m elevation in the *Zona de Amortiguamiento* (buffer zone) of Parque Nacional Montaña de Santa Bárbara, between two small communities at the lower edge of the cloud forest in early February. This locality lies in the Lower Montane Wet Forest formation (Holdridge, 1967; McCranie & Wilson, 2002), where the habitat comprises agriculture and fragments of remnant cloud forest below about 1650 m elevation, and intact cloud forest extending above this point to the peak at approximately 2750 m elevation. There are three ecosystems found on Montaña de Santa Bárbara (House et al., 2002): *Bosque tropical siempreverde latifoliado montano superior, cárstica* (Karstic Upper Montane Evergreen Broadleaf Forest), *Bosque tropical siempreverde latifoliado altimontano, cárstica* (Karstic Altimontane Evergreen Broadleaf Forest), and, above 2000 m elevation, *Bosque tropical siempreverde mixto altimontano, cárstica* (Karstic Altimontane Evergreen Mixed Forest). These unique ecosystems exist only on Montaña de Santa Bárbara, and are characterized by having distinctive plant communities, including endemic species, on well drained karstic soils (House et al., 2002); the type locality of *T. tycherus* lies in the Karstic Upper Montane Evergreen Broadleaf Forest.



FIGURE 4. Montaña de Santa Bárbara, Depto. Santa Bárbara, Honduras, seen from the community of El Cedral, 1580 m elevation, in the vicinity of the type locality of *Typhlops tycherus*. The highest part of the mountain is >2700 m elevation. Photographed 28 January 2008 by JHT.

Etymology. The specific name *tycherus* is derived from the Greek word “tycheros,” meaning “lucky,” and is given in reference to a remarkable string of providential events that preceded the acquisition of the holotype.

Remarks. Another species of the family Typhlopidae, *Ramphotyphlops braminus*, has been introduced to localities throughout Mesoamerica. *Typhlops tycherus* is distinguished from *R. braminus* by having 22–22–22

scales around the body (20–20–20 in *R. braminus*), more dorsal scales between rostral and tail tip (395, versus 290–338 in New World *R. braminus*), and larger maximum total length (371 mm, versus 173 mm in New World *R. braminus*).

Discussion

The era of molecular systematics has not yet impacted our understanding of the genus *Typhlops* in Mesoamerica, and our understanding of the evolutionary relationships of Mesoamerican members of this genus is based largely on characteristics of head scutellation and mensural data that are of undetermined significance in the definition of monophyletic groups. Thus, any effort to discuss possible relationships of *T. tycherus* with other species in the Western Hemisphere is currently limited to only a few phenotypic comparisons.

Although explicit hypotheses of phylogenetic relationships among Mesoamerican species have not yet been put forward, Dixon & Hendricks (1979) postulated the existence of three major radiations of *Typhlops* in the Neotropics: 1) the Caribbean Arc Group, which includes those species from the Bahamas, Cuba, the Cayman Islands, Mesoamerica, northern South America, Grenada, Trinidad, and Tobago that possess a completely divided nasal and the second and third supralabials in contact with the preocular; 2) the Major Antillean Radiation (MAR) Group of Thomas (1976), containing those species from throughout the Greater and Lesser Antilles with a completely divided nasal and only the third supralabial in contact with the preocular; and 3) the South American Group, representing those species restricted to mainland South America with a partially divided nasal shield and the second and third supralabials in contact with the preocular. Dixon & Hendricks (1979) additionally hypothesized that the South American Group is the “oldest” group of western hemisphere *Typhlops*, “based upon its relationship to the African species and the basic premise that this group radiated northward following the Gondwanaland rift,” and further stated that “the Caribbean Arc Group may have evolved from a second invasion of South American *Typhlops* considerably later than the MAR one...” They envisioned the Caribbean Arc Group to include the *biminiensis* Group of Thomas (1976), all Central American species, one northwestern South American species (*T. lehneri*) and the continental island species of northern South America (*T. tasymicris* and *T. trinitatus*).

As expected from biogeography, *Typhlops tycherus* can be placed within the Caribbean Arc Group as recognized by Dixon & Hendricks (1979), based on its possession of a completely divided nasal shield and the second and third supralabials in contact with the preocular (see also the brief discussion in Thomas & Hedges, 2007). Based on the information available for *T. tycherus* and the state of our understanding of evolutionary relationships in the Caribbean Arc Group, little more can be said about the relationship of *T. tycherus* to other Mesoamerican *Typhlops*, save that the new species does not outwardly appear to be closely related to any other member of this group. Substantive improvement of this understanding will have to await more robust and precise phylogenetic estimates.

The herpetofauna of Montaña de Santa Bárbara remains poorly known, due to the relatively limited research that has been conducted on this steep and somewhat difficult to access mountain. Furthermore, the porous nature of this limestone mountain results in the existence of very few permanent streams at cloud forest elevations, limiting opportunities for the existence of endemic stream-associated amphibians. Nonetheless, the better Montaña de Santa Bárbara becomes known, the more exceptional its herpetofauna becomes, as evidenced by the discovery of the distinctive new *Typhlops* described herein. Of the 12 species of amphibians and reptiles known by the authors to occur in the cloud forest areas of Montaña de Santa Bárbara, four are endemic to this mountain, including *T. tycherus*, the plethodontid salamanders *Dendrotriton sanctibarbaris* and *Nototriton limnospectator*, and the polychrotid lizard *Anolis rubribarbaris*. Given the fortuitous discovery of a species as remarkable as *T. tycherus*, we expect that further study of the herpetofauna of this impressive mountain will lead to the discovery of additional endemic species.

Of the four endemic species known only from Montaña de Santa Bárbara, both salamander species are currently considered Endangered by the IUCN (www.redlist.org). Under the IUCN Red List criteria (IUCN, 2001), *Anolis rubribarbaris* would also qualify as Endangered. Given the limited information available for *Typhlops tycherus*, as well as its presumedly secretive fossorial nature, we are reticent to assign a definitive conservation status to this taxon until additional information becomes available and suggest this species be categorized as “Data Deficient.” The discovery of another endemic species in Montaña de Santa Bárbara, 30% of whose known herpetofauna is endemic to that mountain, further strengthens the case for protecting its remaining high-elevation forests.

There are two other Mesoamerican species that are known to grow to total lengths approaching that of the holotype of *Typhlops tycherus*. According to Dixon & Hendricks (1979), *T. costaricensis* has a maximum known total length of 360 mm and *T. microstomus* reaches 366 mm, and, pending the acquisition of additional material, either of those species could potentially meet or exceed the length of *T. tycherus*. Until that time, however, *T. tycherus* is the largest known species of the genus and family in Mexico and Central America.

A key to the Typhlopidae of Mesoamerica

- 1.a. More than 345 dorsal scales between rostral scale and spike-like terminal tail scale.....2
- b. Fewer than 338 dorsal scales between rostral scale and spike-like terminal tail scale
.....*Ramphotyphlops braminus*
- 2.a. 18 dorsal scales around the midbody.....3
- b. 20 or more dorsal scales around the midbody.....5
- 3.a. Subocular scale absent 4
- b. Subocular present *Typhlops microstomus*
- 4.a. Dorsal pattern present, consisting of dark spots on middorsal scales *Typhlops tenuis*
- b. Dorsum pattern absent *Typhlops stadelmani*
- 5.a. 20 dorsal scales around midbody, pigmented scales encircle most or all of body .. *Typhlops costaricensis*
- b. 22 dorsal scales around midbody, well-defined pale yellowish gray to white ventral surface
..... *Typhlops tycherus*

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Appendix. Specimens examined

- Typhlops costaricensis* Jimenez and Savage, 1962 (n=3): HONDURAS: Francisco Morazán: Santa Lucía USNM 564063; Gracias a Dios: Warunta Tingni Kiamp, UF 142609; San San Hil, USNM 563344.
- Typhlops stadelmani* Schmidt, 1936 (n=7): HONDURAS: Copán: Quebrada Grande, UF 142468–74.
- Typhlops tenuis* Salvin 1860 (n=5): MEXICO: Veracruz: Potrero Viejo, USNM 110304; Santecomapan, Santa Marta, Arroya Clara, UF 50284–85; vicinity of Cuautlapan, USNM 224898; between Orizaba and Cuautlapan in the vicinity of Escamela, USNM 224897.